

Remarks

This Reply is made in response to the final Office Action dated October 19, 2011. Claims 5 and 8 – 12 are pending. Claim 5 was amended to more particularly point out and distinctly claim the invention. No new matter has been added. It is respectfully submitted that the rejection under 35 USC 112 has been overcome.

In the Office Action, the Examiner rejected claims 5 and 8-12 under 35 U.S.C. 103(a) as being unpatentable over DE Patent No. 1441336 to Weinstein (“Weinstein”) in view of Chemical Abstracts 120 to Shareef et al. (“Shareef”).

I. Examiner Interview

Applicants would like to thank Examiner John Hoffmann for the courtesies extended in the telephonic interview held on January 10, 2012. Claim amendments were discussed to overcome the rejection under 35 USC 112. The prior art was discussed with respect to not being able to make a dental restoration with the teaching of Shareef since the particle size distribution would not support it. No agreement was reached.

II. Rejection of Claims 5 and 8-12 over Weinstein in view of Shareef

The Examiner refers to the rejection made in the Examiner’s Answer on 11/29/2005 and the Board’s opinion of 7/01/2010. For the reasons set forth below this rejection is respectfully traversed.

The claimed invention is now directed to a method of fabricating a restoration comprising providing a framework possessing a coefficient of thermal expansion of as high as about $18 \times 10^{-6}/^{\circ}\text{C}$; fusing a dental porcelain composition comprising a leucite crystallite phase dispersed in a feldspathic glass matrix to said framework thereby providing a smooth, dental porcelain thereon; said fused dental porcelain composition having a maturing temperature in the range from about 750° to about 1050°C , a coefficient of thermal expansion (room temperature to 450°C) of from about $12 \times 10^{-6}/^{\circ}\text{C}$ to about $17.5 \times 10^{-6}/^{\circ}\text{C}$, and comprising: 57-66 SiO_2 , 7-15 Al_2O_3 , 7-15 K_2O , 7-12 Na_2O and 0.5-3 Li_2O , and comprising a dispersed leucite crystallite phase representing from about 5 to about 65 weight percent of the dental porcelain, and wherein the leucite crystallites possess diameters not exceeding about 10 microns; and wherein the fusing occurs at a temperature in the range from about 750° to about 850°C .

Weinstein is directed to dental restoration materials comprising a leucite crystalline phase for use in preparing crowns, bridges and the like. However, Weinstein does not teach the use of leucite crystals not exceeding about 10 microns in diameter. According to the Examiner, Shareef is cited by the Examiner to show particle size of less than 10 microns in diameter, and which resultant products result in less microcracking and significantly higher biaxial flexural strength. The Examiner concludes that one would have been motivated to use as fine sized particles as would maximize the strength of the final product.

The Examiner's attention is directed to column 1 on page 117 of Shareef which states that the starting powders of MI, CH and FL were reduced using a ball milling process. Fig. 6 shows the particle distribution of the milled powder, which is much smaller in size distribution than the as-received powder. Although the strength increases as the particle size decreases, as acknowledged in Shareef, the smaller particle size distribution creates other problems, such as slumping, due to the reduction in dense packing of the particles. This proves futile for dental ceramics, which require hand building upon a framework to create the final shape and surface of the dental restoration. Such hand building would not be possible with the reduced-size powder taught in Shareef, since the porcelain powder would be unable to maintain its shape during the building and firing steps. Shareef casts the powders into discs, which casting does not require the powder to maintain a shape under its own weight. Shareef uses molds to hold the powder mixture together. There is no need to worry about slumping in the casting process. Therefore, one of ordinary skill would not be inclined to reduce the powder size of Weinstein in view of Shareef, to increase the strength of the dental restoration of Weinstein, since reducing the particle size as carried out by Shareef would create slumping and workability problems.

The Examiner is further requested to direct his attention to the enclosed pages of *Skinner's Science of Dental Materials. Ninth Edition*. Phillips RW., W.B. Saunders Company, Philadelphia, 1991; 512-513. The enclosed pages discuss the importance of particle size distribution. "Porcelain... is supplied as a fine powder that is designed to be mixed with water or another vehicle and condensed into powder form. The powder particles are of a particular size distribution to produce the most dense packing when they

are properly condensed. If the particles were the same size, the density of packing would not be nearly as good.”

Accordingly, one of ordinary skill in the art would not have been led to combine the teachings of Shareef and Weinstein since the outcome would not have produced a workable product. Proper particle size distribution is needed to provide dense packing and proper shrinkage.

In the claimed invention the particle size distribution of porcelain was maintained by glass powder having coarser particles than the particles of the leucite-glass. When the powders are properly mixed, the particle size distribution is similar to that of the classic dental porcelain thus the technician is able to process the porcelain of the invention using known standard techniques. This is not the case in Shareef, which mills all the particles, glass and leucite. The claimed invention is not rendered obvious by the combination of references.

Accordingly, it is believed that claims 5 and 8 – 12 specify patentable subject matter and are in condition for allowance. Applicants therefore respectfully request favorable reconsideration and allowance of this application. The Examiner is requested to telephone applicants’ attorney at the number listed below if it will advance the prosecution of this case. The Patent Office is authorized to charge any fee or credit any overpayment to Deposit Account No. 500730.

Respectfully submitted,

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